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Yasushi Saito

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EXAMINER

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ART UNIT

PAPER NUMBER

2161

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/726,041

Applicant(s)

SAITO ET AL.

Examiner

Brent S. Stace

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 25 September 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-69 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-69 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 13 May 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____.

DETAILED ACTION

Remarks

1. This communication is responsive to the amendment filed September 25th, 2006. Claims 1-69 are pending. In the amendment filed September 25th, 2006, Claims 11, 16, 36, and 56 are amended, and Claims 1, 16, 36, and 56 are the independent Claims. The examiner acknowledges that no new matter was introduced and the claims are supported by the specification. This is the second Office action on the merits.

Response to Arguments

2. Applicant's arguments, filed September 25th, 2006, with respect to the rejections of Claims 1-69 under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) using the Saito reference have been fully considered and are persuasive. Therefore, the rejections have been withdrawn. However, upon further consideration, new grounds of rejection are made in view of "Replication in Ficus Distributed File Systems" (Ficus).

Response to Amendment

Specification

3. The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Drawings

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: 405, 410, and 455 of Fig. 15. Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

5. Since the lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors, Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the drawings. For example, the drawings should be carefully checked to ensure that all reference numerals are described in the specification, that no one reference numeral describes two separate drawing elements, or that the specification contains no reference to numerals not in the drawings.

Claim Objections

6. In light of the applicant's respective arguments or respective amendments, the previous claim objections to the claims have been withdrawn.

Claim Rejections - 35 USC § 112

7. In light of the applicant's respective arguments or respective amendments, some of the previous 35 USC § 112 rejections to the claims have been withdrawn. The rejections below with regard to the (35 USC § 112 rejections) have been maintained.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 60-64 and 67-69 are still rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

10. Claims 60-64 and 67-69 recite the limitation "The method" in line 1. There is insufficient antecedent basis for this limitation in the claim. These claims depend from a system claim, so "method" mentioned in the preamble is improper.

Claim Rejections - 35 USC § 102

11. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

12. Claims 1, 10, 11 are rejected under 35 U.S.C. 102(b) as being anticipated by "Replication in Ficus Distributed File Systems" (Popek et al.).

Claim 1 can be mapped to Popek as follows: "A method for a wide-area file system, including a plurality of replicas for a file, wherein each replica of the file and parent directories for the file are at each of a plurality of nodes, [Popek, page 22, 1st paragraph under "5 The Ficus Project"] the method comprising:

- propagating an update to a replica of the file to other replicas of the file; [Popek, page 21, 1st and 3rd paragraphs under "3 The Optimistic Model"] and
- in response receiving a propagated update to a replica at a node, updating the replica for the file at the node" [Popek, page 21, 1st and 3rd paragraphs under "3 The Optimistic Model"].

Claim 10 can be mapped to Popek as follows: "The method according to claim 1, wherein the replicas include replicas of a first type and of a second type wherein locations of replicas of the first type are registered in a parent directory for a file" [Popek, 1st paragraph under "Abstract" with Popek, 4th paragraph under "3 The Optimistic Model" with Popek, 2nd paragraph under "5 The Ficus Project"].

Claim 11 can be mapped to Popek as follows: "The method according to claim 1, wherein the replicas include replicas of a first type and of a second type and wherein in response to a user accessing a file at a node, the method further comprises steps of replicating the parent directory for the file at the node and forming a replica of the

second type at the node" [Popek, page 21, 3rd paragraph under "3 The Optimistic Model"].

Claim Rejections - 35 USC § 103

13. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

14. Claims 2-9, 16-26, 32, 33, 35-46, 52, 53, 55-66 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Replication in Ficus Distributed File Systems" (Popek et al.) in view of "Designing a Robust Namespace for Distributed File Services" (Zhang et al.) (found in Applicant's IDS).

For **Claim 2**, Popek teaches: "The method according to claim 1, wherein."

Popek discloses the above limitation but does not expressly teach: “each replica has a backpointer including an identification of a parent directory for the file and a name of the file in the parent directory.

With respect to Claim 2, an analogous art, Zhang, teaches: “each replica has a backpointer including an identification of a parent directory for the file and a name of the file in the parent directory” [Zhang, page 2, 2nd paragraph above “2 Problem Abstraction” with Zhang, page 3, paragraph under “Back pointer”].

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Zhang and Popek before him/her to combine Zhang with Popek because both inventions are directed towards distributed file replication.

Zhang’s invention would have been expected to successfully work well with Popek’s invention because both inventions use file replication. Popek discloses Replication in Ficus Distributed File Systems comprising updating and propagating replicas. However, Popek does not expressly disclose backpointers. Zhang discloses Designing a Robust Namespace for Distributed File Services comprising backpointers.

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Zhang and Popek before him/her to take the backpointers from Zhang and install it into the invention of Popek, thereby offering the obvious advantage of minimizing overhead in guaranteeing namespace consistency and breaking down file service operations into simple namespace primitives for easy namespace consistency and/or operation recovery.

Claim 3 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 2, wherein the parent directories are modified when the backpointer for a replica at a node is not consistent with the parent directories for the replica at the node" [Zhang, pages 2-3, "2 Problem Abstraction"].

Claim 4 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 3, wherein modifying the parent directories occurs only after a delay" [Zhang, pages 2-3, "2 Problem Abstraction"].

Claim 5 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 3, wherein multiple modifications to the parent directories at the node are performed according to an order in which corresponding updates occur" [Zhang, page 2, 2nd paragraph above "2 Problem Abstraction" with Zhang, page 3 bullet 2 under "3 System Model and Failure Assumptions" with Zhang, page 4 paragraph under "4.2 Failure-free protocols" with Zhang, page 7 col. 1 with Zhang, page 7, Fig. 8].

Claim 6 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 3, wherein a modification is performed at the node and an earlier inconsistent modification is ignored" [Popek, page 21, middle paragraph in col. 2 or Zhang, page 3, paragraph above "3 System Model and Failure Assumptions"].

Claim 7 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 2, wherein a directory operation affects the backpointer for the file" [Zhang, page 4, paragraph under "Link"].

Claim 8 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 7, wherein the directory operation is selected from a group

consisting of rename, link and unlink" [Zhang, page 2, section 2 "Problem Abstraction" with Zhang, page 4, Fig. 3 with Zhang, page 5, Fig. 4].

Claim 9 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 8, wherein when the backpointer for a replica at a node is not consistent with the parent directories for the replica at the node, further comprising modifying the parent directories to be consistent with the backpointer [Zhang, pages 2-3, "2 Problem Abstraction" with Zhang, pages 2-3, paragraphs under Table 2 to "3 System Model and Failure Assumptions"]".

For **Claim 16**, Popek teaches: "A method for a wide-area file system, including a plurality of replicas for a file, [Popek, page 22, 1st paragraph under "5 The Ficus Project"] and wherein upon access of the file by a user at a node, the method comprises steps of:

- replicating parent directories for the file at the node; [Popek, page 21, 3rd paragraph under "3 The Optimistic Model"] and
- forming a replica of the file at the node wherein" [Popek, page 21, 3rd paragraph under "3 The Optimistic Model"]].

Popek discloses the above limitations but does not expressly teach:

- "...the replica includes a backpointer, and the backpointer includes an identification of a parent directory for the file and a name of the file within the parent directory."

With respect to Claim 16, an analogous art, Zhang, teaches:

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- "...the replica includes a backpointer, and the backpointer includes an identification of a parent directory for the file and a name of the file within the parent directory" [Zhang, page 2, 2nd paragraph above "2 Problem Abstraction" with Zhang, page 3, paragraph under "Back pointer"].

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Zhang and Popek before him/her to combine Zhang with Popek because both inventions are directed towards distributed file replication.

Zhang's invention would have been expected to successfully work well with Popek's invention because both inventions use file replication. Popek discloses Replication in Ficus Distributed File Systems comprising updating and propagating replicas. However, Popek does not expressly disclose backpointers. Zhang discloses Designing a Robust Namespace for Distributed File Services comprising backpointers.

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Zhang and Popek before him/her to take the backpointers from Zhang and install it into the invention of Popek, thereby offering the obvious advantage of minimizing overhead in guaranteeing namespace consistency and breaking down file service operations into simple namespace primitives for easy namespace consistency and/or operation recovery.

Claim 17 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 16, further comprising propagating an update to a replica of the file to other replicas of the file" [Popek, page 21, 1st and 3rd paragraphs under "3 The Optimistic Model"].

Claim 18 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 17, wherein the update is forwarded according to a graph for the file" [Popek, page 22, 3rd paragraph under "5 The Ficus Project"].

Claim 19 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 17, wherein in response receiving a propagated update to a replica at a node, the node updates parent directories for the file at the node" [Popek, page 21, 4th paragraph under "3The Optimistic Model"].

Claim 20 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 17, wherein when a backpointer for a replica at a node is not consistent with parent directories for the replica at the node, the method further comprises modifying the parent directories to be consistent with the backpointer" [Zhang, pages 2-3, "2 Problem Abstraction" with Zhang, pages 2-3, paragraphs under Table 2 to "3 System Model and Failure Assumptions"].

Claim 21 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 20, wherein said modifying is performed only after a delay" [Zhang, pages 2-3, "2 Problem Abstraction"].

Claim 22 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 20, wherein multiple modifications to the parent directories at the node are performed according to an order in which corresponding updates occur" [Zhang, page 2, 2nd paragraph above "2 Problem Abstraction" with Zhang, page 3 bullet 2 under "3 System Model and Failure Assumptions" with Zhang, page 4 paragraph under "4.2 Failure-free protocols" with Zhang, page 7 col. 1 with Zhang, page 7, Fig. 8].

For **Claim 23**, Popek (as modified by Zhang) teaches: "The method according to claim 20, wherein a modification is performed at the node and an earlier inconsistent modification is ignored" [Popek, page 21, middle paragraph in col. 2 or Zhang, page 3, paragraph above "3 System Model and Failure Assumptions"].

Claim 24 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 17, wherein a directory operation affects the backpointer for the file" [Zhang, page 4, paragraph under "Link"].

Claim 25 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 24, wherein the directory operation is selected from a group consisting of rename, link and unlink" [Zhang, page 2, section 2 "Problem Abstraction" with Zhang, page 4, Fig. 3 with Zhang, page 5, Fig. 4].

Claim 26 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 24, wherein when the backpointer for a replica at a node is not consistent with parent directories for the replica at the node, the method further comprises modifying the parent directories to be consistent with the backpointer" [Zhang, pages 2-3, "2 Problem Abstraction" with Zhang, pages 2-3, paragraphs under Table 2 to "3 System Model and Failure Assumptions"].

Claim 32 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 16, further comprising locating a parent directory of the file" [Zhang, page 2, 1st paragraph under "2 Problem Abstraction" with Zhang, pages 3-4, under "4.1 Data structures" to Fig. 2 with Popek, page 21, 3rd paragraph under "3 The Optimistic Model"].

Claim 33 can be mapped to Popek (as modified by Zhang) as follows: “The method according to claim 32, wherein said replicating the parent directories comprises copying contents of the parent directory located by said locating” [Popek, page 21, 3rd paragraph under “3 The Optimistic Model” with Popek, page 22, 2nd paragraph under “5 The Ficus Project”].

Claim 35 can be mapped to Popek (as modified by Zhang) as follows: “The method according to claim 33, wherein said forming the replica of the file comprises a copying contents of a replica of the file located by said locating” [Popek, page 21, 3rd paragraph under “3 The Optimistic Model” with Popek, page 22, 2nd paragraph under “5 The Ficus Project”].

Claim 36 encompasses substantially the same scope of the invention as that of Claim 16 in addition to a method and some steps for performing the method of Claim 16. Therefore, Claim 36 is rejected for the same reasons as stated above with respect to Claim 16. Additionally, Claim 36 recites a limitation which is met by Popek as shown: “wherein locations of replicas of the first type are registered in a parent directory for a file, and wherein upon access of a file by a user at a node” [Popek, 1 paragraph under “Abstract” with Popek, 4th paragraph under “3 The Optimistic Model” with Popek, 2nd paragraph under “5 The Ficus Project”].

Claims 37-43 encompass substantially the same scope of the invention as that of Claims 17-23, respectfully, in addition to an apparatus and some means for performing the method of Claims 17-23, respectfully. Therefore, Claims 37-43 are

rejected for the same reasons as stated above with respect to Claims 17-23, respectfully.

Claim 44 can be mapped to Popek (as modified by Zhang) as follows: "The method according to claim 37, wherein a directory operation is performed on the backpointer for the file" [Zhang, page 4, paragraph under "Link"].

Claims 45, 46, 52, 53, and 55 encompass substantially the same scope of the invention as that of Claims 25, 26 and 32, 33, and 35, respectfully, in addition to an apparatus and some means for performing the method of Claims 25, 26 and 32, 33, and 35, respectfully. Therefore, Claims 45, 46, 52, 53, and 55 are rejected for the same reasons as stated above with respect to Claims 25, 26 and 32, 33, and 35, respectfully.

For **Claim 56**, Popek teaches: "A system including:

- a plurality of nodes that store replicas of files, [Popek, page 22, 1st paragraph under "5 The Ficus Project"]
- wherein for each replica at a node, the node stores parent directories for the file [Popek, page 22, 1st paragraph under "5 The Ficus Project"] ... and
- wherein the nodes are configured to propagate updates to replicas of each file to other replicas of the file" [Popek, page 21, 1st and 3rd paragraphs under "3 The Optimistic Model"].

Popek discloses the above limitations but does not expressly teach:

- "...and a backpointer having an identification of a parent directory for the file."

With respect to Claim 56, an analogous art, Zhang, teaches:

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- "...and a backpointer having an identification of a parent directory for the file"

[Zhang, page 2, 2nd paragraph above "2 Problem Abstraction" with Zhang, page 3, paragraph under "Back pointer"].

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Zhang and Popek before him/her to combine Zhang with Popek because both inventions are directed towards distributed file replication.

Zhang's invention would have been expected to successfully work well with Popek's invention because both inventions use file replication. Popek discloses Replication in Ficus Distributed File Systems comprising updating and propagating replicas. However, Popek does not expressly disclose backpointers. Zhang discloses Designing a Robust Namespace for Distributed File Services comprising backpointers.

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Zhang and Popek before him/her to take the backpointers from Zhang and install it into the invention of Popek, thereby offering the obvious advantage of minimizing overhead in guaranteeing namespace consistency and breaking down file service operations into simple namespace primitives for easy namespace consistency and/or operation recovery.

Claim 57 can be mapped to Popek (as modified by Zhang) as follows: "The system according to claim 56, wherein in response to receiving a propagated update to a replica at a node, the node updates the parent directories for the file at the node" [Popek, page 21, paragraphs 3 and 4 under "3 The Optimistic Model" with Popek, page 22 paragraphs 1-3 under "5 The Ficus Project"].

Claims 58, 59, and 60-65's limitation(s) have already been met by Claims 20, 21, and 22-26, and 10's limitation(s), respectfully. Therefore, Claims 58, 59, and 60-65 are rejected for the same reason(s) as stated above with respect to Claims 20, 21, 22-26, and 10, respectfully.

Claim 66 can be mapped to Popek (as modified by Zhang) as follows: "The system according to claim 56, wherein in response to a user accessing a file at a node, a replica of the file is formed at the node" [Popek, page 21, 3rd paragraph under "3 The Optimistic Model"].

15. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over "Replication in Ficus Distributed File Systems" (Popek et al.) in view of "The Costs and Limits of Availability for Replicated Services" (Yu et al.) (found in Applicant's IDS).

For **Claim 12**, Popek teaches: "The method according to claim 11, wherein."

Popek discloses the above limitation but does not expressly teach: "...a minimum number of replicas of the first type are maintained according to a minimum replication factor for the corresponding file."

With respect to Claim 12, an analogous art, Yu, teaches: "...a minimum number of replicas of the first type are maintained according to a minimum replication factor for the corresponding file" [Yu, page 1, last paragraph, with Yu, page 12, Figs. 11 and 12 with Yu, page 12, last paragraph in "5.3 Effects of Replication Scale" with Popek, page 21, 3rd paragraph under "3 The Optimistic Model"].

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Yu and Popek before him/her to combine Yu with Popek because both inventions are directed towards replicating files to achieve higher availability.

Yu's invention would have been expected to successfully work well with Popek's invention because both inventions use file replication. Popek discloses Replication in Ficus Distributed File Systems comprising updating and propagating replicas. However, Popek does not expressly disclose a minimum replication factor. Yu discloses the costs and limits of availability for replicated services comprising determining a degree of replication.

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Yu and Popek before him/her to take the degree of replication from Yu and install it into the invention of Popek, thereby offering the obvious advantage of system developers being able to determine a degree of replication to achieve a target service availability.

16. Claims 13, 15, 29, 31, 49, 51, 67, and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Replication in Ficus Distributed File Systems" (Popek et al.) in view of U.S. Patent Application Publication No. 2002/0107835 (Coram et al.).

For **Claim 13**, Popek teaches: "The method according to claim 1."

Popek discloses the above limitation but does not expressly teach: "wherein a replica is deleted by marking the replica as invalid."

With respect to Claim 13, an analogous art, Coram, teaches: "wherein a replica is deleted by marking the replica as invalid" [Coram, paragraph [0047]].

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Coram with Popek because both inventions are directed towards deleting data.

Coram's invention would have been expected to successfully work well with Popek's invention because both inventions use computers modifying computer storage. Popek discloses Replication in Ficus Distributed File Systems comprising updating and deleting replicas, however Popek does not expressly disclose marking objects/replicas as invalid. Coram discloses a system and method for adaptive result set caching comprising marking objects/replicas as invalid.

It would have been obvious to one of ordinary skill in the art at the time of invention to take the marking objects/replicas as invalid from Coram and install it into the invention of Popek thereby offering the obvious advantage of having the objects/replicas still available after "deletion" (marking invalid) so that the objects/replicas may be recovered by a user if necessary.

Claim 15 can be mapped to Popek (as modified by Coram) as follows: "The method according to claim 13, further comprising periodically removing replicas marked as invalid" [Coram, paragraph [0050] with Coram, paragraph [0047]].

For **Claim 29**, Popek teaches: "The method according to claim 16."

Popek discloses the above limitation but does not expressly teach: "wherein a replica is deleted by marking the replica as invalid."

With respect to Claim 29, an analogous art, Coram, teaches: "wherein a replica is deleted by marking the replica as invalid" [Coram, paragraph [0047]].

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Coram with Popek because both inventions are directed towards deleting data.

Coram's invention would have been expected to successfully work well with Popek's invention because both inventions use computers modifying computer storage. Popek discloses Replication in Ficus Distributed File Systems comprising updating and deleting replicas, however Popek does not expressly disclose marking objects/replicas as invalid. Coram discloses a system and method for adaptive result set caching comprising marking objects/replicas as invalid.

It would have been obvious to one of ordinary skill in the art at the time of invention to take the marking objects/replicas as invalid from Coram and install it into the invention of Popek thereby offering the obvious advantage of having the objects/replicas still available after "deletion" (marking invalid) so that the objects/replicas may be recovered by a user if necessary.

Claim 31 can be mapped to Popek (as modified by Coram) as follows: "The method according to claim 29, further comprising periodically removing replicas marked as invalid" [Coram, paragraph [0050] with Coram, paragraph [0047]].

Claims 49 and 51 encompass substantially the same scope of the invention as that of Claims 29 and 31, respectfully, in addition to an apparatus and some means for performing the method of Claims 29 and 31, respectfully. Therefore, Claims 49 and 51

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are rejected for the same reasons as stated above with respect to Claims 29 and 31, respectfully.

Claims 67 and 69's limitation(s) have already been met by Claims 29 and 31's limitation(s), respectfully. Therefore, Claims 67 and 69 are rejected for the same reason(s) as stated above with respect to Claims 29 and 31, respectfully.

17. Claims 14, 30, 50, and 68 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Replication in Ficus Distributed File Systems" (Popek et al.) in view of U.S. Patent Application Publication No. 2002/0107835 (Coram et al.), further in view of "Designing a Robust Namespace for Distributed File Services" (Zhang et al.) (found in Applicant's IDS).

For **Claim 14**, Popek (as modified by Coram) teaches: "The method according to claim 13."

Popek (as modified by Coram) discloses the above limitation but does not expressly teach: "wherein said marking the replica as invalid comprises removing the backpointer for the replica."

With respect to Claim 14, an analogous art, Zhang, teaches: "wherein said marking the replica as invalid comprises removing the backpointer for the replica" [Zhang, page 3, section 2 "Problem Abstraction"].

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Zhang with Popek (as modified by Coram) because both inventions are directed towards distributed storage services with namespaces.

Zhang's invention would have been expected to successfully work well with Popek (as modified by Coram)'s invention because both inventions use files and directories with namespaces for distributed storage. Popek (as modified by Coram) discloses Replication in Ficus Distributed File Systems comprising updating and deleting replicas, however Popek (as modified by Coram) does not expressly disclose marking the replica as invalid comprises removing the backpointer for the replica. Zhang discloses the designing of a robust namespace for distributed file services comprising removing the backpointer for the replica.

It would have been obvious to one of ordinary skill in the art at the time of invention to take the removing the backpointer for the replica from Zhang and install it into the invention of Popek (as modified by Coram), thereby offering the obvious advantage of an efficient way of creating an orphaned object, thereby violating Zhang's namespace rules and requiring special considerations for maintaining namespace integrity.

For **Claim 30**, Popek (as modified by Coram) teaches: "The method according to claim 29."

Popek (as modified by Coram) discloses the above limitation but does not expressly teach: "wherein said marking the replica as invalid comprises removing the backpointer for the replica."

With respect to Claim 30, an analogous art, Zhang, teaches: "wherein said marking the replica as invalid comprises removing the backpointer for the replica" [Zhang, page 3, section 2 "Problem Abstraction"].

It would have been obvious to one of ordinary skill in the art at the time of invention to combine Zhang with Popek (as modified by Coram) because both inventions are directed towards distributed storage services with namespaces.

Zhang's invention would have been expected to successfully work well with Popek (as modified by Coram)'s invention because both inventions use files and directories with namespaces for distributed storage. Popek (as modified by Coram) discloses Replication in Ficus Distributed File Systems comprising updating and deleting replicas, however Popek (as modified by Coram) does not expressly disclose marking the replica as invalid comprises removing the backpointer for the replica. Zhang discloses the designing of a robust namespace for distributed file services comprising removing the backpointer for the replica.

It would have been obvious to one of ordinary skill in the art at the time of invention to take the removing the backpointer for the replica from Zhang and install it into the invention of Popek (as modified by Coram), thereby offering the obvious advantage of an efficient way of creating an orphaned object, thereby violating Zhang's namespace rules and requiring special considerations for maintaining namespace integrity.

Claim 50 encompasses substantially the same scope of the invention as that of Claim 30 in addition to a method and some steps for performing the method of Claim 30. Therefore, Claim 50 is rejected for the same reasons as stated above with respect to Claim 30.

Claim 68's limitation(s) have already been met by Claim 30's limitation(s).

Therefore, Claim 68 is rejected for the same reason(s) as stated above with respect to Claim 30.

18. Claims 27, 28, 47, and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Replication in Ficus Distributed File Systems" (Popek et al.) in view of "Designing a Robust Namespace for Distributed File Services" (Zhang et al.) (found in Applicant's IDS), further in view of "The Costs and Limits of Availability for Replicated Services" (Yu et al.) (found in Applicant's IDS).

For **Claim 27**, Popek (as modified by Zhang) teaches: "The method according to claim 16, wherein."

Popek (as modified by Zhang) discloses the above limitation but does not expressly teach: "...a minimum number of replicas for a file are maintained according to a minimum replication factor for the file."

With respect to Claim 27, an analogous art, Yu, teaches: "...a minimum number of replicas for a file are maintained according to a minimum replication factor for the file" [Yu, page 1, last paragraph, with Yu, page 12, Figs. 11 and 12 with Yu, page 12, last paragraph in "5.3 Effects of Replication Scale" with Popek, page 21, 3rd paragraph under "3 The Optimistic Model"].

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Yu and Popek (as modified by Zhang) before him/her

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to combine Yu with Popek (as modified by Zhang) because both inventions are directed towards replicating files to achieve higher availability.

Yu's invention would have been expected to successfully work well with Popek (as modified by Zhang)'s invention because both inventions use file replication. Popek (as modified by Zhang) discloses Replication in Ficus Distributed File Systems comprising updating and propagating replicas. However, Popek (as modified by Zhang) does not expressly disclose a minimum replication factor. Yu discloses the costs and limits of availability for replicated services comprising determining a degree of replication.

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Yu and Popek (as modified by Zhang) before him/her to take the degree of replication from Yu and install it into the invention of Popek (as modified by Zhang), thereby offering the obvious advantage of system developers being able to determine a degree of replication to achieve a target service availability.

Claim 28 can be mapped to Popek (as modified by Zhang and Yu) as follows:

"The method according to claim 27, wherein links between replicas of a file form a graph for the file and wherein updates to the file are propagated along the graph" [Popek, page 22, 3rd paragraph under "5 The Ficus Project"].

Claims 47 and 48 encompass substantially the same scope of the invention as that of Claims 27 and 28, respectfully, in addition to an apparatus and some means for performing the method of Claims 27 and 28, respectfully. Therefore, Claims 47 and 48

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are rejected for the same reasons as stated above with respect to Claims 27 and 28, respectfully.

19. Claims 34 and 54 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Replication in Ficus Distributed File Systems" (Popek et al.) in view of "Designing a Robust Namespace for Distributed File Services" (Zhang et al.) (found in Applicant's IDS), further in view of "UNIX man pages : cp()" (Christias).

For **Claim 34**, Popek (as modified by Zhang) teaches: "The method according to claim 33, wherein."

Popek (as modified by Zhang) discloses the above limitation but does not expressly teach: "said locating and copying are performed recursively, thereby traversing a pathname for the file."

With respect to Claim 34, an analogous art, Christias, teaches: "said locating and copying are performed recursively, thereby traversing a pathname for the file" [Christias, page 1, -R and -r flags].

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Christias and Popek (as modified by Zhang) before him/her to combine Christias with Popek (as modified by Zhang) because both inventions are directed towards copying files on UNIX computers.

Christias's invention would have been expected to successfully work well with Popek (as modified by Zhang)'s invention because both inventions use UNIX computers. Popek (as modified by Zhang) discloses a Replication in Ficus Distributed

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File Systems comprising updating and propagating replicas. However, Popek (as modified by Zhang) does not expressly disclose recursive copying and locating. Christias discloses the manual pages for the copy command in UNIX comprising copying files recursively.

It would have been obvious to one of ordinary skill in the art at the time of invention having the teachings of Christias and Popek (as modified by Zhang) before him/her to take the recursive copying from Christias and install it into the invention of Popek (as modified by Zhang), thereby offering the obvious advantage of issuing only one command to copy multiple file system objects.

Claim 54 encompasses substantially the same scope of the invention as that of Claim 34, in addition to an apparatus and some means for performing the method of Claim 34. Therefore, Claim 54 is rejected for the same reasons as stated above with respect to Claim 34.

Conclusion


20. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant is advised that, although not used in the rejections above, any prior art cited on the PTO-892 form and not relied upon is considered materially relevant to the applicant's claimed invention and/or portions of the claimed invention.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Brent S. Stace whose telephone number is 571-272-8372 and fax number is 571-273-8372. The examiner can normally be reached on M-F 9am-5:30pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jeffrey A. Gaffin can be reached on 571-272-4146. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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